

## STEM-Rich Afterschool Making: Materials List for Circuit Boards

This document outlines a starting place for gathering materials to make Circuit Boards, the second activity in the 6-week series. Circuit Boards is an open-ended activity that supports students' exploration and understanding of how to make an electrical circuit. This knowledge is foundational for the Maker activities in subsequent weeks.

The activity is designed to encourage young people to “complexify” their thinking over time. A variety of components and variables allows students to begin where they are comfortable, getting a feel for what they know and don't know. As they master the basics, they can add switches, buzzers, lights, and explore parallel and series circuits as a means for getting their ideas to work.



20 Reusable Circuit Boards			\$652	
3.0 V power source (AA)	\$0.65	20	\$13	Part # 216081 (2 AA) <a href="http://www.jameco.com">www.jameco.com</a>
4.5 V power source (AA)	\$0.99	10	\$10	Part # 216136 (3 AA) <a href="http://www.jameco.com">www.jameco.com</a>
6.0 V power source (AA)	\$0.99	10	\$10	Part # 216152 (4 AA) <a href="http://www.jameco.com">www.jameco.com</a>
AA batteries	\$0.35	70	\$25	<a href="http://www.cheap-batteries.com/p/MN1500AA-PRC.html">http://www.cheap-batteries.com/p/MN1500AA-PRC.html</a>
Wire tester		1	\$0	9V battery and buzzer wired to 2 nails
9V battery holder	\$0.79	1	\$1	Part # 216427 <a href="http://www.jameco.com">www.jameco.com</a>
Alligator clip leads	\$7.95	25	\$199	there are cheaper ones, but these are the best <a href="http://www.jameco.com/webapp/wcs/stores/servlet/Product_10001_10001_2210239_-1">http://www.jameco.com/webapp/wcs/stores/servlet/Product_10001_10001_2210239_-1</a>
Hand crank generator	\$34.00	2	\$68	<a href="http://www.arborsci.com/deluxe-hand-crank-generator">http://www.arborsci.com/deluxe-hand-crank-generator</a>
Single bulb board	\$1.50	20	\$30	<a href="http://www.arborsci.com/miniature-bulb-base">http://www.arborsci.com/miniature-bulb-base</a>
Triple bulb board	\$4.50	8	\$36	<a href="http://www.arborsci.com/miniature-bulb-base">http://www.arborsci.com/miniature-bulb-base</a>
Spare bulbs	\$5.63	6	\$34	boxes of 10, Part #1505K355 <a href="http://www.mcmaster.com">www.mcmaster.com</a>
Piezo buzzer	\$1.95	5	\$10	Part # 2173861 <a href="http://www.jameco.com">www.jameco.com</a>
Doorbell	\$6.00	2	\$12	estimate, from hardware store
Motor	\$1.15	8	\$9	Item #851230 <a href="http://www.kelvin.com">www.kelvin.com</a>
Potentiometer w/ knob	\$5.20	4	\$21	Part #023-500 <a href="http://www.parts-express.com">www.parts-express.com</a> & Part # 6094K21 <a href="http://www.mcmaster.com">www.mcmaster.com</a>
Knife switch - Single pole, single throw	\$1.79	10	\$18	Part #SB09736M <a href="http://www.enasco.com">www.enasco.com</a>

Knife switch - Single pole, double throw	\$1.50	5	\$8	Part #SB09737M <a href="http://www.enasco.com">www.enasco.com</a>
Knife switch - double pole, double throw	\$4.30	3	\$13	Part #SB24049M <a href="http://www.enasco.com">www.enasco.com</a>
Light switch	\$1.50	2	\$3	estimate, from hardware store
Doorbell switch	\$3.00	1	\$3	estimate, from hardware store
Scavenged switches	\$2.00	5	\$10	estimate, from hardware store
Home made switches	\$4.00	2	\$8	tilt and slinky
Toy parts - arm	\$2.50	6	\$15	contact Lianna Ikali@exploratorium.edu
Toy parts - legs	\$2.50	6	\$15	contact Lianna Ikali@exploratorium.edu
Toy parts - tail	\$2.50	6	\$15	contact Lianna Ikali@exploratorium.edu
Toy parts - scavenged	\$2.50	2	\$5	optional
Pine boards 1x4"	\$8.00	3	\$24	estimate, from lumber yard
Nails	\$23.70	1	\$24	copper or stainless steel <a href="http://www.mcmaster.com/#97952a101/=yqk5xq">http://www.mcmaster.com/#97952a101/=yqk5xq</a>
Screws (#2, pan head and flat head)	\$10.00	1	\$10	estimate, from hardware store or <a href="http://www.mcmaster.com">www.mcmaster.com</a>
Clamp for motor mount	\$0.75	8	\$6	Part # 9439T43 <a href="http://www.mcmaster.com">www.mcmaster.com</a>

Note: Materials sourced for 20 participants.